

Life Sciences as Related to Space (F)

Genetic, Epigenetic and Metabolic Changes of Biosystems in Spaceflight and Simulated Spaceflight Environment (F4.6)

Consider for oral presentation.

INDUCTION OF CELL DEATH THROUGH ALTERATION OF OXIDANTS AND ANTIOXIDANTS IN EPITHELIAL CELLS EXPOSED TO HIGH ENERGY PROTONS

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Radiation affects several cellular and molecular processes including double strand breakage, modifications of sugar moieties and bases. In outer space, protons are the primary radiation source which poses a range of potential health risks to astronauts. On the other hand, the use of proton radiation for tumor radiation therapy is increasing as it largely spares healthy tissues while killing tumor tissues. Although radiation related research has been conducted extensively, the molecular toxicology and cellular mechanisms affected by proton radiation remain poorly understood. Therefore, in the present study, we irradiated rat epithelial cells (LE) with different doses of protons and investigated their effects on cell proliferation and cell death. Our data showed an inhibition of cell proliferation in proton irradiated cells with a significant dose dependent activation and repression of reactive oxygen species (ROS) and antioxidants, glutathione and superoxide dismutase respectively as compared to control cells. In addition, apoptotic related genes such as caspase-3 and -8 activities were induced in a dose dependent manner with corresponding increased levels of DNA fragmentation in proton irradiated cells than control cells. Together, our results show that proton radiation alters oxidant and antioxidant levels in the cells to activate apoptotic pathway for cell death.